

Claims

What is claimed is:

1. A compact camera device for communication devices, comprises:
 - a base;
 - 5 a lens group for converting an image of an object to a certain magnification;
 - an image sensor for picking up an image of an object projected from said lens group, said image sensor being fixed at the base;
 - a driving section for finely moving said lens group in an optical axis direction; and
 - 10 a control unit for outputting electrical control signals to said driving section to vary the image magnification of the object, said control unit driving said image sensor.
2. The compact camera device for communication devices according to claim 1, wherein said lens group comprises:
 - a fixed lens group which is fixed at said base and which is aligned with said image sensor in the optical axis direction; and
 - 15 a movable lens group which changes its position in the optical axis direction by said driving section to vary a magnification.
3. The compact camera device for communication devices according to claim 1, 20 wherein said driving section comprises:
 - a magnet which is fixed at any one side of either said base or said movable lens group and of which polarity is divided in the optical axis; and
 - a coil for generating a magnetic field toward said magnet responsive to said electrical signals, said coil being fixed at the other side of either said base or said movable

lens group.

4. The compact camera device for communication devices according to claim 3,
wherein said coil is provided with a yoke for concentrating the magnetic flux to said
5 magnet and circulating the magnetic flux.

5. The compact camera device for communication devices according to claim 3,
wherein said magnet is fixed at said movable lens group; said coil is made of a pair of
coils; and said pair of coils are respectively installed at both ends of a path where said
10 magnet moves.

6. The compact camera device for communication devices according to claim 3,
wherein said control unit applies a strong electric current to said coil to thereby move said
movable lens group at a large width in order to perform an optical zoom.

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7. The compact camera device for communication devices according to claim 3,
wherein said control unit applies a weak electric current to said coil to thereby move said
movable lens group at a slight width in order to make a focal point of an image to be
picked up by said image sensor.

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8. The compact camera device for communication devices according to claim 1 or
2, wherein said base comprises a guide shaft which is fixed at said base in the optical axis
direction; and

said movable lens group is fixed at a first lens barrel which includes a guide hole

for passing through said guide shaft.

9. The compact camera device for communication devices according to claim 1 or 2, wherein said base includes a restoring means for pressurizing said movable lens group to 5 its photographing position.

10. The compact camera device for communication devices according to claim 9, wherein said restoring means is a compression spring, which comprises the first lens barrel for fixing said movable lens group, said compression spring exerting an elastic force to 10 said first lens barrel.

11. The compact camera device for communication devices according to claim 1, wherein said lens group comprises:

15 a fixed lens group fixed at said base which is aligned with said image sensor in the optical axis direction; and

a movable lens group installed so as to finely move in the optical axis direction,

wherein said driving section comprises:

a first driving section for actuating said movable lens group from a common photographing position to a 1-time zoom magnification photographing position; and

20 a second driving section for actuating said movable lens group from the 1-time zoom magnification photographing position to a 2-times zoom magnification photographing position, and

wherein said control unit controls said first driving section and said second driving section to vary respective image magnification.

12. The compact camera device for communication devices according to claim 11, wherein said first driving section comprises:

5 a first coil which is wound at any one side of either said base or said movable lens group, and is supplied with a electric current from said control unit; and

a first magnet for providing a magnetic flux of different directions to said first coil, said first magnet being installed at the other side of either said base or said movable lens group.

10 13. The compact camera device for communication devices according to claim 12, wherein said control unit applies a strong electric current to said first coil to move said movable lens group at a large width in order to perform an optical zoom.

15 14. The compact camera device for communication devices according to claim 12, wherein said control unit applies a weak electric current to said first coil to move said movable lens group at a small width in order to perform focusing operation.

15. The compact camera device for communication devices according to claim 11, wherein said second driving section comprises:

20 a second coil which is wound at any one side of either said base or said movable lens group, and is supplied with an electric current from said control unit; and

a second magnet for providing a magnetic flux of different directions to said second coil, said second magnet being fixed at the other side of either said base or said movable lens group.

16. The compact camera device for communication devices according to claim 15, wherein said control unit applies a strong electric current to said second coil to move said movable lens group at a large width in order to perform an optical zoom.

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17. The compact camera device for communication devices according to claim 15, wherein said control unit applies a weak electric current to said second coil to move said movable lens group at a small width in order to perform focusing operation.

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18. The compact camera device for communication devices according to claim 11, wherein said compact camera device further comprises guide means for guiding said movable lens group so as to move in the optical axis direction.

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19. The compact camera device for communication devices according to claim 18, wherein said guide means comprises:

a guide shaft which is fixed at said base in the optical axis direction; and
a lens barrel having a guide hole through which said guide shaft passes, said lens barrel installing said movable lens group.

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20. The compact camera device for communication devices according to claim 1, wherein said driving section comprises:

a lens holder for fixing said lens group so that said image sensor can be aligned with the optical axis;

a coil which is wound at said lens holder to be fixed;

a plate spring, one end of which is fixed at said base and the other end of which is connected to said coil to restore said coil to its initial position; and

a magnet fixed at said base which applies a magnetic flux to said coil to generate an electromagnetic force to actuate said lens holder in the optical axis direction,

5 characterized in that said control unit applies electrical signals to said coil through said plate spring.

21. The compact camera device for communication devices according to claim 20, wherein said compact camera device further comprises initial position setting means installed to said base for setting an appropriate initial position of said lens holder.

22. The compact camera device for communication devices according to claim 1, wherein said driving section comprises:

15 a lens holder for fixing said lens group so that said image sensor can be aligned with the optical axis;

a coil which is wound at said lens holder to be fixed;

a magnet fixed at said base, which applies a magnetic flux to said coil to generate an electromagnetic force which actuates said lens holder in the optical axis direction when 20 power is applied to said coil; and

initial position setting means installed to said base for setting an appropriate initial position of said lens holder,

characterized in that said control unit applies electric signals to said coil.

23. The compact camera device for communication devices according to claim 21 or 22, wherein said initial position setting means comprises:

- a second guide shaft fixed at said base in the optical axis direction;
- a lever wherein a second shaft hole is formed so as to rotate on said second guide shaft and wherein a slope is formed at the upper part; and
- a lifting prominence which is formed at the lens holder, and which contacts the slope to be raised and lowered by said lever.

24. The compact camera device for communication devices according to claims 20 to 22, wherein said compact camera device further comprises guide means for guiding said lens holder so as to move in the optical axis direction.

25. The compact camera device for communication devices according to claim 24, wherein said guide means comprises:

- 15 a first guide shaft fixed at said base in the optical axis direction; and
- a shaft holder which is formed at said lens holder and which has a guide hole coupled to said guide shaft so as to be slidable in the optical axis direction.

26. The compact camera device for communication devices according to any one of claims 20 to 22, wherein said compact camera device comprises a magnetic circulation yoke for inducing a magnetic flux of said magnet to said coil.

27. The compact camera device for communication devices according to claim 1, wherein a cover, which protects said lens holder and said driving section from the outside

and which has a light passing hole passing a light to said lens group, is coupled to said base.

28. The compact camera device for communication devices according to claims 20
5 to 22, wherein said lens group comprises a filter at the upper side of said image sensor to
block the infrared rays.

29. The compact camera device for communication devices according to claim 1,
wherein said driving section comprises:

10 a lens barrel for aligning each lens of said lens group in the optical axis direction;
a suspension member for raising said lens barrel from said base so that said lens
barrel can finely move at a predetermined interval away from said image sensor; and
an adjustment section for adjusting the gap between said lens group and said
image sensor to clarify the image which has passed through said lens group and then is
15 picked up by said image sensor.

30. The compact camera device for communication devices according to claim 29,
wherein said suspension member comprises at least two wires of which both ends are
supported by said base and of which the center portion is fixed at the side of said lens
20 barrel.

31. The compact camera device for communication devices according to claim 30,
wherein said wires comprise a spring portion having a tensile elastic force at its center
portion.

32. The compact camera device for communication devices according to claim 29, wherein said adjustment section comprises:

5 a coil which is wound at any one side of either said base or said lens barrel and to which an electric current is applied from said control unit; and a magnet which is fixed at the other side of either said base or said lens barrel and of which polarity is divided so that a magnetic flux may pass any horizontal portion of said coil.

10 33. The compact camera device for communication devices according to claim 32, wherein said adjustment section further comprises a magnetic substance for effectively circulating the magnetic flux of said magnet, said magnetic substance being fixed at said base that is the backside of said magnet.

15 34. The compact camera device for communication devices according to claim 29, wherein said compact camera device further comprises a guide means so that said movable lens group can move in the optical axis direction.

20 35. The compact camera device for communication devices according to claim 34, wherein said guide means comprises a guide shaft which is fixed at said base in the optical axis direction and coupled to said guide hole formed at said lens barrel so as to be slidable.

36. The compact camera device for communication devices according to claim 1, wherein said driving section comprises:

a lens holder for fixing said lens group as said image sensor is aligned with the optical axis;

a coil for generating a magnetic field in the optical axis direction when an electric current is applied, said coil being wound at one side of either said base or said lens holder;

5 a magnet for actuating said lens holder by a repulsive force with the magnetic field of said coil, said magnet being fixed at the other side of either said base or said lens holder to which said coil is not fixed; and

an initial position setting means installed to said base for adjusting an initial position of said lens holder,

10 characterized in that said control unit applies power to said coil to adjust the focusing of said lens group.

37. The compact camera device for communication devices according to claim 36, wherein said initial position setting means comprises:

15 a lever which forms a slope for raising or lowering said lens holder in the optical axis direction, said lever being supported by said base so as to be rotatable; and

an elastic member for pushing said lens holder toward said lever.

38. The compact camera device for communication devices according to claim 36, 20 wherein said compact camera device further comprises guide means for guiding said lens holder so as to move in the optical axis direction.

39. The compact camera device for communication devices according to claim 38, wherein said guide means comprises:

a first guide shaft fixed at said base in the optical axis direction; and
a shaft holder having a shaft hole which is coupled to said guide shaft so as to be
slidable in the optical axis direction, said shaft holder being formed at said lens holder.

5 40. The compact camera device for communication devices according to claim 38,

wherein said guide means comprises:

a guide protrusion formed at said lens holder; and
a guide groove for guiding said guide protrusion so as to be slidable in the optical
axis direction, said guide groove being formed at said base in the optical axis direction.

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41. The compact camera device for communication devices according to claim 36,
wherein said compact camera device comprises a yoke for circulating the magnetic flux of
said magnet.

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42. The compact camera device for communication devices according to claim 36,
wherein said compact camera device further comprises:

a fixing block coupled to said base; and
pipe pins which are coupled so as to pass through said fixing block and which
have a cavity through which a lead wire connected to said coil passes.

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43. The compact camera device for communication devices according to claim 1,
wherein said lens group consists of a plurality of lenses which convert an image of an
object to a certain magnification and which is installed so as to finely move in the optical
axis direction as said image sensor is aligned with the optical axis; and

wherein said driving section comprises a coil which is wound at one side of either said base or said lens group; a magnet fixed at the other side of either said base or said lens group; and a yoke induces the magnetic flux of said magnet to generate an electromagnetic force which actuates said lens module in the optical axis direction when power is applied 5 to said coil,

characterized in that said control unit applies electric signals to said coil.

44. The compact camera device for communication devices according to claim 43, wherein said control unit applies a weak electric current to said coil to move said lens 10 group at a small width to thereby clarify the focus of the image of the object which is passed through each lens of said lens group and is picked up by said image sensor.

45. The compact camera device for communication devices according to claim 43, wherein said compact camera device further comprises guide means for guiding said 15 movable lens group so as to move in the optical axis direction.

46. The compact camera device for communication devices according to claim 45, wherein said guide means consists of a guide shaft which is fixed at said base in the optical axis direction and which is coupled to said guide hole formed at said lens group so as to be 20 slidable in the optical axis direction.

47. The compact camera device for communication devices according to claim 43, wherein said compact camera device comprises restoring means for restoring said lens module to its initial position.

48. The compact camera device for communication devices according to claim 47, wherein said restoring means comprises a compression spring which is supported by a cover surrounding said lens module to exert an elastic force to said lens module.

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49. The compact camera device for communication devices according to claim 1, wherein said compact camera device further comprises:

a lens holder for fixing said lens group; and

a suspension member for supporting said lens holder so as to finely move on said 10 base in the optical axis direction,

characterized in that said driving section actuates said lens holder on said base in the optical axis direction.

50. The compact camera device for communication device according to claim 1, 15 wherein said suspension means comprises at least two elastic members for maintaining the balance of said lens holder by exerting an elastic force at both sides of the optical axis, said suspension means being supported on said base.

51. The compact camera device for communication device according to claim 49, 20 wherein said driving section comprises:

a coil which is fixed at any one side of either said base or said lens holder, which is wound in the orthogonal direction of the optical axis, and to which power is supplied from said control unit; and

a magnet which is fixed at the other side of either said base or said lens holder and

which provides a magnetic flux in the orthogonal direction of the optical axis.

52. The compact camera device for communication device according to claim 51,
wherein said driving section further comprises a yoke of a magnetic substance for restoring
5 the magnetic flux, which has passed said coil, to said magnet.

53. The compact camera device for communication devices according to claim 52,
wherein said yoke comprises:

10 a supporting portion for supporting said magnet; and
an inserting portion which is integrated with said supporting portion and which is
installed through the center of said coil.

54. The compact camera device for communication devices according to claim 51,
wherein said lens holder comprises a bobbin which is wound around said coil and which
15 has a cavity so that said inserting portion can pass through the center thereof.

55. The compact camera device for communication devices according to claim 49,
wherein said control unit detects a focusing error of said lens group from the output signals
transmitted from said image sensor, and actuates said lens holder when a focusing error
20 occurs, thereby making an image of an object to be clear.

56. The compact camera device for communication devices according to claim 49,
wherein said compact camera device further comprises guide means for guiding said lens
holder so as to move in the optical axis direction.

57. The compact camera device for communication devices according to claim 56,
wherein said guide means comprises:

at least one guide shaft fixed at said base in the optical axis direction; and
5 a shaft holder which is formed at said lens holder and which has a shaft hole
coupled to said guide shaft so as to be slidable in the optical axis direction.